PLANETARY PHENOMENA FOR MAY AND JUNE, 1902.

By Malcolm McNeill.

May.

There will be a partial eclipse of the Sun on May 7th. It is rather larger than the one on April 8th, the maximum obscuration being about five sixths of the Sun's diameter, but it is visible only in the South Pacific. New Zealand is about the only large land-mass in its path.

Mercury is an evening star throughout the month, having passed superior conjunction on April 28th. At the beginning of May it is too near the Sun to be seen; but by the end of the first week it is far enough away to show in the evening twilight, and for the last ten days of the month it remains above the horizon nearly two hours after sunset. It reaches greatest east elongation (23°) on May 28th. This is rather smaller than the west elongation in March, but is better than the east elongation in February. It gives the best opportunity of the year for seeing the planet.

Venus is still morning star, and throughout the month rises about two hours before sunrise. It passed its greatest west elongation in April, and the distance between the planet and the Sun is beginning to diminish, but the rate is as yet very slow, less than 1° for the month.

Venus will be perceptibly less bright than it was during April, but no other planet will compare with it.

Mars is drawing a little farther away from the Sun, but is still too near for naked-eye observation. By the end of the month it rises a little less than an hour before sunrise. It reaches its maximum distance from the Earth on May 20th. It is then 226,000,000 of miles away from us, about 8,000,000 less than its average maximum.

Jupiter rises earlier than during April — before midnight by the end of May; so it is getting into good position for early-morning observation. It is still in the constellation *Capricorn*, and moving eastward, but at a much diminished rate, only 2° during the month.

Saturn rises about an hour earlier than *Jupiter*, and by the end of the month is far enough above the horizon to be seen with the naked eye at midnight. It ceases its eastward motion among the stars on May 8th and begins to retrograde, but very

slowly. Naked-eye observations will show very little change in its position during the month.

Uranus rises early enough for late evening observations toward the close of the month. It is in *Ophiuchus* between *Sagittarius* and *Scorpio*, and moves about 1° westward during the month.

Neptune is still in the evening sky, but sets earlier. It is in conjunction with *Mercury*, the latter passing about 3° north, on May 29th.

JUNE.

The Sun reaches its maximum declination at the summer solstice June 22d, 1 A.M., Pacific time.

Mercury is still an evening star, and remains in good position for observation until nearly the middle of the month. This prolonged period of visibility — over a month — is due partly to the fact that it is in aphelion on June 17th, and hence its elongation from the Sun is greater than the average. After the middle of the month it rapidly approaches the Sun and reaches inferior conjunction on June 23d.

Venus still keeps up its relative position with respect to the Sun, and the interval between the rising of the planet and that of the Sun increases about a quarter of an hour, although the apparent distance diminishes about 2°. The reason for the increased interval is, that *Venus* is still moving northward, while the Sun begins to move southward at the solstice, on June 22d, this causing a greater change in relative time of rising than the change in the opposite direction caused by diminution of distance.

Mars is drawing a little farther away from the Sun, and by the end of the month rises about an hour and a half before sunrise; but it will not be an easy object, on account of its faintness.

At the end of June *Jupiter* will rise before 10 P.M.. It ceases its eastward motion and begins to move westward on June 6th. By the end of the month it will have moved about 1°, and will be in about the same position it held in the middle of May, in the eastern part of *Capricorn*.

Saturn is in the western part of the same constellation, and is also moving westward, not quite 2° during the month. It can now be made out easily, before midnight or earlier, toward the end of the month.

Uranus is above the horizon practically the whole night, and comes to opposition on June 10th. It moves westward about 1°.

At the beginning of the month it is a little less than 2° north of the third-magnitude star *θ Ophiuchi.*

Neptune is in conjunction with the Sun on June 23d, and changes from an evening to a morning star.

MAY–JUNE, 1902.

PHASES OF THE MOON, P. S. T.

New Moon	May	7,	2h 45m	P.M.
First Quarter	May	14,	5 40	A.M.
Full Moon	May	22,	2 46	
Last Quarter	May	30,	4 00	
New Moon	June	5,	10 11	P.M.
First Quarter	June	12,	3 54	
Full Moon	June	20,	6 17	
Last Quarter	June	28,	1 52	

THE SUN.

1902.	R. A.	Declination	Rises.	Transits.	Sets.
May 1,	2h 31m	+ 14° 52′	5h 5m A.M.	11h 57m A.M.	6h 49m P.M.
11,	3 10	+ 17 42	4 55	11 56	6 57
21,	3 49	+ 20 03	4 45	11 56	7 7
31,	4 30	+ 21 49	4 39	11 57	7 15
June 10,	5 11	+ 22 58	4 36	11 59	7 22
20,	5 52	+ 23 26	4 36	12 1 P.M.	7 26
30,	6 34	+ 23 13	4 39	12 3	7 27

MERCURY.

May 1,	2 42	+ 15 56	5 12 A.M.	12 8 P.M.	7 4 P.M.
11,	4 6	+ 22 40	5 31	12 53	8 15
21,	5 19	+ 25 27	5 52	1 26	9 00
31,	6 8	+ 24 57	6 4	1 36	9 8
June 10,	6 27	+ 22 39	5 54	1 15	8 36
20,	6 14	+ 20 03	5 12	12 23	7 34
30,	5 52	+ 18 44	4 15	11 21 A.M.	6 27

VENUS.

May 1,	23 39	+ 2 56	3 15 A.M.	9 5 A.M.	2 55 P.M.
11,	0 18	+ 0 29	3 4	9 5	3 6
21,	0 58	+ 4 13	2 52	9 6	3 20
31,	1 40	+ 8 3	2 41	9 8	3 35
June 10,	2 23	+ 11 48	2 31	9 11	3 51
20,	3 8	+ 15 16	2 23	9 16	4 9
30,	3 54	+ 18 16	2 20	9 24	4 28

MARS.

May 1,	2 4	+ 12 10	4 49 A.M.	11 30 A.M.	6 11 P.M.
11,	2 32	+ 14 41	4 28	11 19	6 10
21,	3 1	+ 16 58	4 10	11 9	6 8
31,	3 31	+ 18 58	3 51	10 58	6 5
June 10,	4 0	+ 20 39	3 36	10 49	6 2
20,	4 30	+ 21 59	3 20	10 39	5 58
30,	5 0	+ 22 59	3 6	10 29	5 52

Jupiter.

May	1,	21	12	—	16	46	1	37	A.M.	6	39	A.M.	11 41 A.M.
June	1,	21	20	—	16	19	11	42	P.M.	4	45		9 48
July	1,	21	16	—	16	43	9	41		2	43		7 45

Saturn.

May	1,	19	59	—	20	35	12	39	A.M.	5	26	A.M.	10 13 A.M.
June	1,	19	58	—	20	43	10	37	P.M.	3	23		8 9
July	1,	19	51	—	21	4	8	33		1	18		6 3

Uranus.

May	1,	17	20	—	23	12	10	7	P.M.	2	43	A.M.	7 19 A.M.
June	1,	17	15	—	23	8	8	4		12	41		5 18
July	1,	17	10	—	23	2	5	56		10	33	P.M.	3 10

Neptune.

May	1,	5	57	+	22	20	8	3	A.M.	3	23	P.M.	10 43 P.M.
June	1,	6	2	+	22	21	6	4		1	25		8 46
July	1,	6	6	+	22	21	4	11		11	32	A.M.	6 53

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Off left-hand limb as seen in an inverting telescope.)

I, D,	May	7,	4^h	56^m	A.M.	III, D,	June	1,	9^h 19^m P.M.
II, D,		7,	11	55	P.M.	III, R,		2,	12 50 A.M.
I, D,		8,	11	24	P.M.	IV, D,		6,	11 26 P.M.
II, D,		15,	2	29	A.M.	IV, R,		7,	3 59 A.M.
I, D,		16,	1	19	A.M.	I, R,		8,	1 29 A.M.
I, D,		23,	3	12	A.M.	II, D,		8,	11 27 P.M.
I, D,		24,	9	41	P.M.	III, D,		9,	1 19 A.M.
I, D,		31,	11	35	P.M.	III, R,		9,	4 50 A.M.
						I, D,		15,	3 23 A.M.
						II, D,		16,	2 1 A.M.
						I, D,		16,	9 12 P.M.
						II, D,		23,	4 35 A.M.
						IV, R,		23,	10 7 P.M.
						I, D,		23,	11 46 P.M.

APPROXIMATE ELEMENTS OF THE ORBITS OF THE COMETS FROM 1896 TO 1901.

BY W. J. HUSSEY.

In number 50 of these *Publications* (June, 1896), a number of tables compiled by the late Professor WINLOCK are printed, giving the approximate elements of all computed orbits of comets